# Gr 11 Core Term I Project Due By November 13 / 2014

ثانوية التكنولوجيا التطبيقية

Applied Technology High School

**Grade 11 Core.** **Section:**

**1- Students Name:**

**2- Students Name :**

**3- Students Name :**

**4- Students Name :**

## Introduction:

What can you do with trig? Historically, it was developed for astronomy and geography, but scientists have been using it for centuries for other purposes, too. Besides other fields of mathematics, trig is used in physics, engineering, and chemistry. Within mathematics, trig is used in primarily in calculus (which is perhaps its greatest application), linear algebra, and statistics. Since these fields are used throughout the natural and social sciences, trig is a very useful subject to know.

Trigonometric tables were created over two thousand years ago for computations in astronomy. The stars were thought to be fixed on a crystal sphere of great size, and that model was perfect for practical purposes. Only the planets moved on the sphere. The kind of trigonometry needed to understand positions on a sphere is called spherical trigonometry. Spherical trigonometry is rarely taught now since its job has been taken over by linear algebra. Nonetheless, one application of trigonometry is astronomy.

## In this project:

Student will go through all the tasks, solving, calculating, graphing, proving and explaining the answers.
Students should search for real life applications on trigonometric functions and write in details about one of the applications.
Students are expected to apply and graph all kinds of transformations on trigonometric function.

## Directions:

This project will be done in groups of 3 or 4 students. All names must be listed on the front page of their work. Complete all tasks. You will be graded on completeness, correctness, and neatness. You may download and use a graph software that is easy to use and control from the following sites: For windows use the link: https://www.padowan.dk/download/. For Mac use the link: https://www.padowan.dk/mac/

## Details:

1. Submit your work as a soft copy.

2. Use the PowerPoint in your presentation.

3. Due date for this project is on 13th of November 2014

## ***Task 1***:

I. Search and list at least five real life applications on trigonometric functions.

II. Write in details about one of the real life applications in your list; including: the trigonometric formulas or functions used, the purpose of using them, and some of the results (and their meanings) got by using those trigonometric formulas or functions.

## Task 2: The Harmonic Motion Using Vernier

Many things around us vibrate or oscillate. A vibrating tuning fork, a moving child's playground swing, and the speaker in a headphone are examples of this motion.

One simple system that vibrates is a mass hanging from a spring. This motion is called simple harmonic motion and the position can be modeled with

$$y(t) = a \sin b(t - h) + k$$

In this equation y is the vertical displacement from the equilibrium position, $t$ is the time.

Set the Simple Harmonic Motion experiment with Vernier. Make a soft copy for the resultant graph and use it to find the following:

The amplitude:

The period

The mid line

The vertical line

The phase shift

Write the equation of the graph.

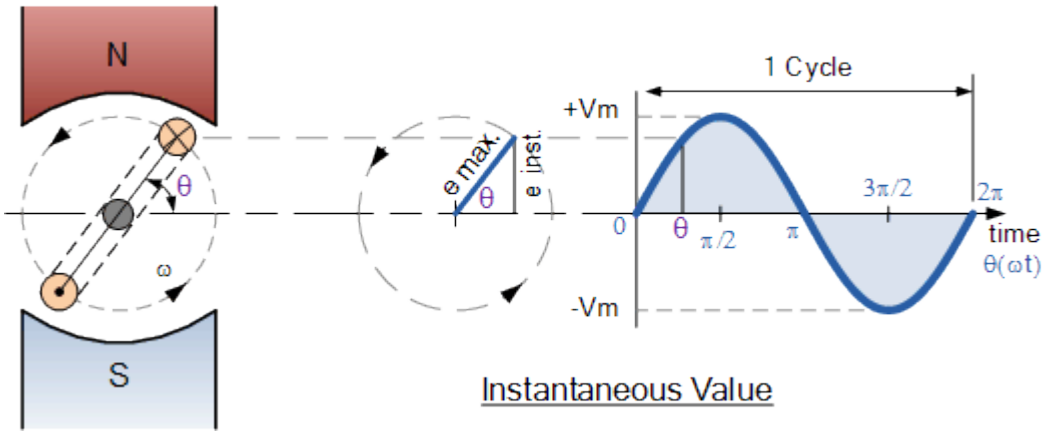
What is the frequency $f$ in terms of the period?

Repeat the experiment 2 more times, changing the mass once, and amplitude another time. Records the data, the position functions, and the graphs of each time.

## Task 3: Generation of Sinusoidal Waveforms (Inverse Trig Functions)

What will happen if a single conductor is rotated within a stationary field? What will be induced by this movement?

You have learnt in your workshop about Electro-Motive Force. Now we need to model it as sine wave graph.




The general form of the sine wave function is given as $y(t) = A\sin(bt)$. Now answer the following:

I. At what angle $\theta$, the value of $V$ is maximum?
II. At what angle $\theta$, the value of $V = 0$?
III. At what angle $\theta$,the value of $V$ is minimum?
IV. Fill the values on the table below

| **Coil Angle $\theta$** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **$V_{inst}$ value** | **0** | **0.5 $A$** | $\frac{\sqrt{2}}{2}A$ | $\frac{\sqrt{3}}{2}A$ | $-\frac{1}{2}A$ | $-\frac{\sqrt{3}}{2}A$ | $-A$ | **0** |

Prepare a model that shows the relation between the angular movement and the amplitude of sine function.

Task-4:

In Physics they study the height of water in oceans for different reasons. Physicians found that the height "h" of the water in a harbor rose to a maximum height of 15 feet at 6:00 p.m. and then dropped to a minimum level of 3 feet by 3:00 a.m. The water level can be modeled by a sine function.

1. Write an equation that represents the height *h* of the water *at any time of a day.* ***(Hint: To write the equation you need to find the following):***
   I. The amplitude.
   II. The period.
   III. The phase shift.
   IV. The vertical shift.

2. *Graph the function.*
3. *Find the height of the water at 6:00 a.m. and 12:00 p.m.*
4. *At what times of the day the height of water approaches approximately 8.89 feet?*
5. *How can studying the height of water in oceans be useful for people?*

**Task 5: Presentation**

Students need to present their work as follows:

1. A Document that includes all of their data, functions, and graphs.
2. A photo for the team in the progress of each task, which will be included in the presentation.
3. A presentation or Prezi that summarize your findings.

# The Rubric

| | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|
| **Completeness of Tasks**<br><br>**20%** | Tasks are totally completed and correct. (100%) | Tasks are partially completed,<br>OR<br>Partially wrong.(75%) | Tasks are partially completed,<br>AND<br>Partially wrong (50%). | Tasks are Attempted (25% or less) | ____ |
| **Presentation and Integration of Technology**<br><br>**70%** | Students used one mean of technology. The tool used helped the student and was useful to support his project. Moreover, the student was able to explain the work he/she submitted confidently and fluently; he/she was **able to answer all** of colleagues and instructor's questions | Student used a mean of technology but it was not that supportive to the topic. In addition, student was able to explain the work he/she submitted confidently and fluently and he/she reflected an understanding of his/her works. The student was **able to answer most** of colleagues and instructor's questions. | Student was able to explain the work he/she submitted. Student reflected a shallow understanding of his/her work; she was **able to answer some** of colleagues and instructor's questions, | Student use of technology was primitive and way below the level of other IAT students. Student was unable to explain the work he/she submitted. Student reflected no understanding of his/her work; he/she was **unable to answer any** of colleagues and instructor's questions. | ____ |
| **Creativity& enrichment**<br><br>**10%** | Student had an outstanding addition in **all aspects** of his/her project. | Student had an outstanding addition in **some aspects** of his/her project. | Student had an outstanding addition in **very few aspects** of his/her project. | Student had an outstanding addition in **no aspects** of his/her project. | ____ |
| **This rubric is out of 100, percentage orientation.**<br><br>**To make the mark out of 30 (Student's Mark/10*3)** | | | | **Total---->** | ____ |